

USAID Enterprise Development Implementation Grant Program Learning Network



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CASE STUDY

New ICT Solutions to Age-Old Problems: Case of the IGP India Project

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Abstract

This case study shares the experiences of ACDI/VOCA in India as it developed an information and communication technology (ICT) application to improve information flows and communication in a fresh fruit and vegetable value chain. This document provides lessons and recommendations for other value chain development programs considering an ICT solution.

About ACDI/VOCA and the IGP India Project

ACDI/VOCA is a private, nonprofit organization that promotes broad-based economic growth and the development of civil society in emerging democracies and developing countries. ACDI/VOCA takes a comprehensive, analytical approach to increasing efficiencies along entire agricultural value chains, from crop production, post-harvest handling and processing, to marketing and improving access, to critical inputs and services by small-scale producers.

In 2006, ACDI/VOCA received an Implementation Grant Proposal (IGP) award from the U.S. Agency for International Development (USAID) to develop ICT-enabled applications to improve the efficiency of private sector extension services and fresh produce supply chain management in India. The award was based primarily on the achievements of ACDI/VOCA's Growth Oriented Micro-Enterprise Development (GMED) program, which focused on the integration of smallholder fresh fruit and vegetable (FFV) farmers into organized retail supply chains, as well as the significant improvement of the operations of these chains.

The IGP India Program developed ICT-enabled wireless software applications that are accessible on handheld devices. The applications enable field extension agents to address information gaps that constrain fruit and vegetable farmers and allow other supply chain participants to monitor and control both back- and front-end supply chain functions. The system makes it possible for a production sponsor (e.g., a fresh produce wholesaler and/or retailer, farmer organization, or other intermediary) to schedule farmer production in advance of planting, as well as all other steps needed to ensure on-time delivery of the proper products to meet customer demand. The goal of the application is to minimize inventory requirements and reduce produce wastage—adding value for both the production sponsor and the farmer.

About SEEP

The SEEP Network (www.seepnetwork.org) is an association of over 70 international nongovernmental organizations (NGOs) that support micro- and small enterprise development programs around the world. SEEP's mission is to connect microenterprise practitioners in a global learning community. SEEP brings members and other practitioners together in a peer learning environment to produce practical, innovative solutions to key challenges in the industry. SEEP then disseminates these solutions through training, publications, professional development, and technical assistance.

About the Enterprise Development IGP Learning Network

The Implementation Grant Program (IGP) is a competitive grant program coordinated by the Microenterprise Development office of USAID that serves as a key mechanism for supporting international and local providers of microfinance and value chain development efforts.

The Enterprise Development (ED) IGP seeks to support innovations for enhanced microenterprise participation in value chains. It also supports creative, commercial strategies for ensuring the access of value chain actors to the services and products needed to be competitive in the marketplace. The ED IGP Learning Network, managed by SEEP, brings together three grantees to document and share their experiences in learning products. The ED IGP learning products are written by and for practitioners in the field of agribusiness and enterprise development. For other learning products in this series, please visit <http://seepnetwork.org/pages/EntDevIGP.aspx>.

Introduction

Developing and facilitating farmers' relationships with end markets has been a development challenge for many decades. Information and communications technology (ICT) solutions have been tested in many projects as a practical way of solving several issues in this domain. Whether using voice mail, text messaging, radio, Internet, or software-based solutions, ICT provides practitioners with manifold options to improve information flows within value chains.

More affordable technologies are available to farmers around the world than ever before, and better ICT solutions—rendered in local languages—are now feasible. India, with its highly developed ICT sector and huge base of smallholder farmers, presents a perfect environment for developing an ICT-based solution for linking small, dispersed farmers with large, organized buyers, wholesalers, and national retail chains.

This case study describes IGP India's experience of identifying and choosing an ICT solution, called *freshConnect*, to address its value chain constraints. It provides lessons and recommendations for other value chain development programs considering an ICT solution.

ICT Solutions and Value Chain Development

At the beginning of the project in 2007, ACDI/VOCA hired a consulting firm to conduct a value chain study and determine whether an ICT solution would be beneficial. The study analyzed various questions similar to those listed in box 1. These questions may be helpful for any organization considering an ICT solution for value chain development.

The study concluded that several stakeholders in the agribusiness value chain believed an ICT solution would be a useful tool to enable multidirectional information flow throughout the chain. That same year, the study's findings were validated by the fact that another ICT innovation—e-Choupal (www.echoupal.com), which introduced information kiosks for farmers—was successfully introduced to another agribusiness value chain in India. The e-Choupal application set the trend for backward linkages and showed how retailers could source directly from farmers and bring about unique farmer loyalty programs. As retailers were open to the idea of introducing ICT initiatives to connect all actors in the supply chain, ACDI/VOCA decided to start the development of *freshConnect*.

IGP India and *freshConnect*

Maintaining on-time, programmed delivery of fresh produce from a large and scattered production base is a complex and critical operation. The IGP India program, through a partnership with Infosys, developed an ICT-enabled application called *freshConnect* (see box 2 for more information).

The *freshConnect* application was designed as a backbone to connect an entire fresh fruit and vegetable (FFV) supply chain and to provide management functions. It was not meant to be a “solution in a box”; instead, *freshConnect* and other program elements function as a set of tools that greatly increase the effectiveness of a FFV supply chain.

The following sections detail the steps followed by ACDI/VOCA to develop this ICT solution.

Box 1. Is ICT Right for this Value Chain?

- What value does ICT add to the value chain?
- Does an ICT solution satisfy all stakeholders' interests?
- How much does our organization want to invest in developing an ICT solution?
- Can our project leverage any existing or past initiatives, instead of starting fresh and possibly being redundant?
- In addition to developing the ICT solution, what needs to be built to meet overall project objectives? For example, will the ICT solution require significant capacity building of users and/or institutions?
- What would be the indirect costs involved in using the ICT solution along the value chain?

Box 2. What is *freshConnect*?

The *freshConnect* suite of applications consists of wireless software applications that are accessible on handheld devices, such as mobile phones. These applications enable field extension agents to address information gaps that constrain vegetable and fruit farmers and permit other supply chain participants to monitor and control both back- and front-end supply chain functions. Specifically, the applications:

- facilitate production planning, coordination, and provision of extension services for fresh produce—processes that integrate multiple actors in the supply chain (i.e., farmers, retailers, exporters, input providers, logistics providers)
- provide technical information and expert advice to farmers on demand through handheld devices, thereby ensuring that the fresh produce grown meets buyer specifications
- improve the quality, food safety, and reliability of the fresh produce supply through a traceability function
- enable smallholder horticulture farmers to profitably participate in these supply chains

Step 1. Define the Problem and Propose a Solution

The constraints and problem areas in the supply chain management of fresh produce in India were identified by the predecessor of the IGP India project, the Growth Oriented Micro-Enterprise Development (GMED) program. The goal of GMED was to develop viable, commercially sustainable, and scalable approaches to fostering the growth of micro- and small enterprises. The project focused on linking smallholder vegetable and fruit producers with organized wholesale, retail, export, and processing enterprises, and on helping build farmers' capacity to meet the requirements of those enterprises.

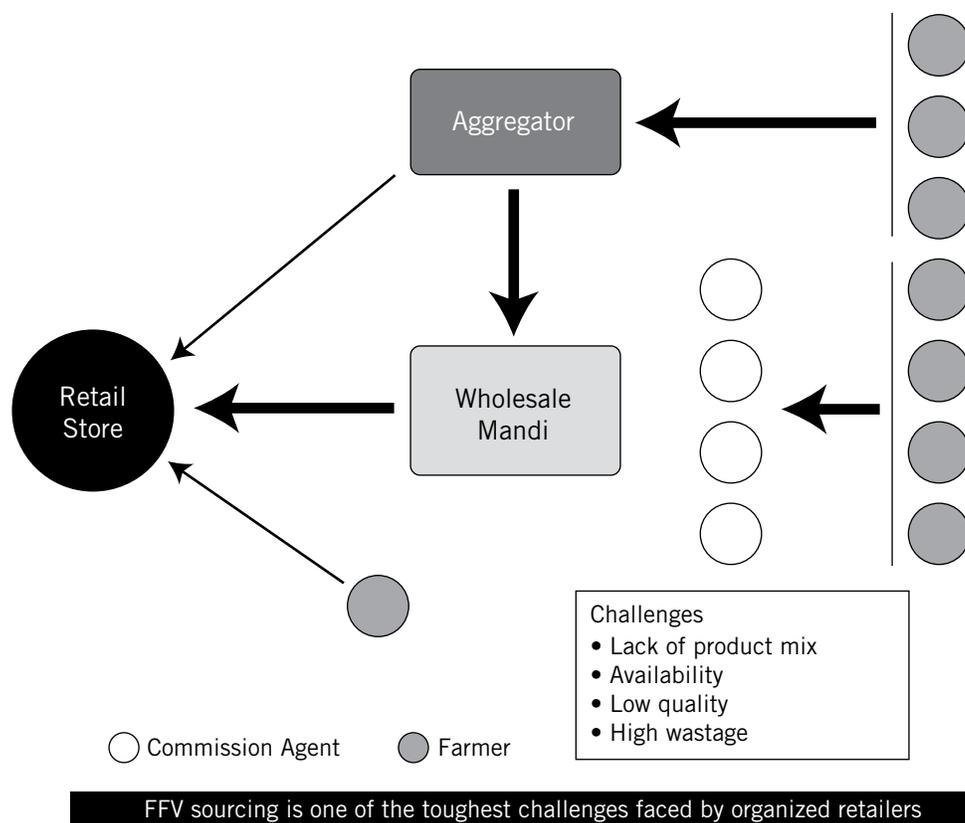
Over the course of GMED (2004–2008), a number of different value chain models were operating in the Indian fresh produce sector. The traditional model was, and still is, directed by the original Agricultural Produce Marketing Committee (APMC) Act. This Act mandates the sale of all fresh produce through the *mandi* system, which consists of government-sanctioned markets located throughout the country. In the *mandi* system, farmers make initial sales to brokers through commission agents. The produce then goes through the hands of several vertical layers of brokers and, finally, to buyers. Unfortunately, the system is nontransparent, often exploitative of farmers, and leads to excessive wastage and value loss due to overhandling and inadequate storage and transport conditions.

In 2002, the federal government of India amended the APMC Act to allow organized wholesalers and retailers to purchase produce directly from farmers. This change eliminated several layers of intermediaries and tended to reduce wastage and value loss. However, retailers and wholesalers now faced a new set of problems when procuring directly from farmers:

- a mismatch between farmer skills and organized retail requirements
- lack of adequate farm-to-market infrastructure
- unreliable procurement models and supply sources that require excessive time and attention, for which retailers have not planned
- lack of control over product quality and mix
- excessive wastage and value loss when moving product from farms to retail stores
- little possibility of implementing crop scheduling or traceability

To reduce the effect of some of these problems, the organized retailers introduced a “direct” procurement model. This model involves an organized wholesaler or retailer that operates countrywide collection centers, as well as purchasing from walk-in farmer suppliers. This procurement method tends to provide greater financial benefits to farmers, mainly because it provides them an opportunity to plan their production to meet the needs of a buyer.

Figure 1. FFV Sourcing: Traditional APMC Model

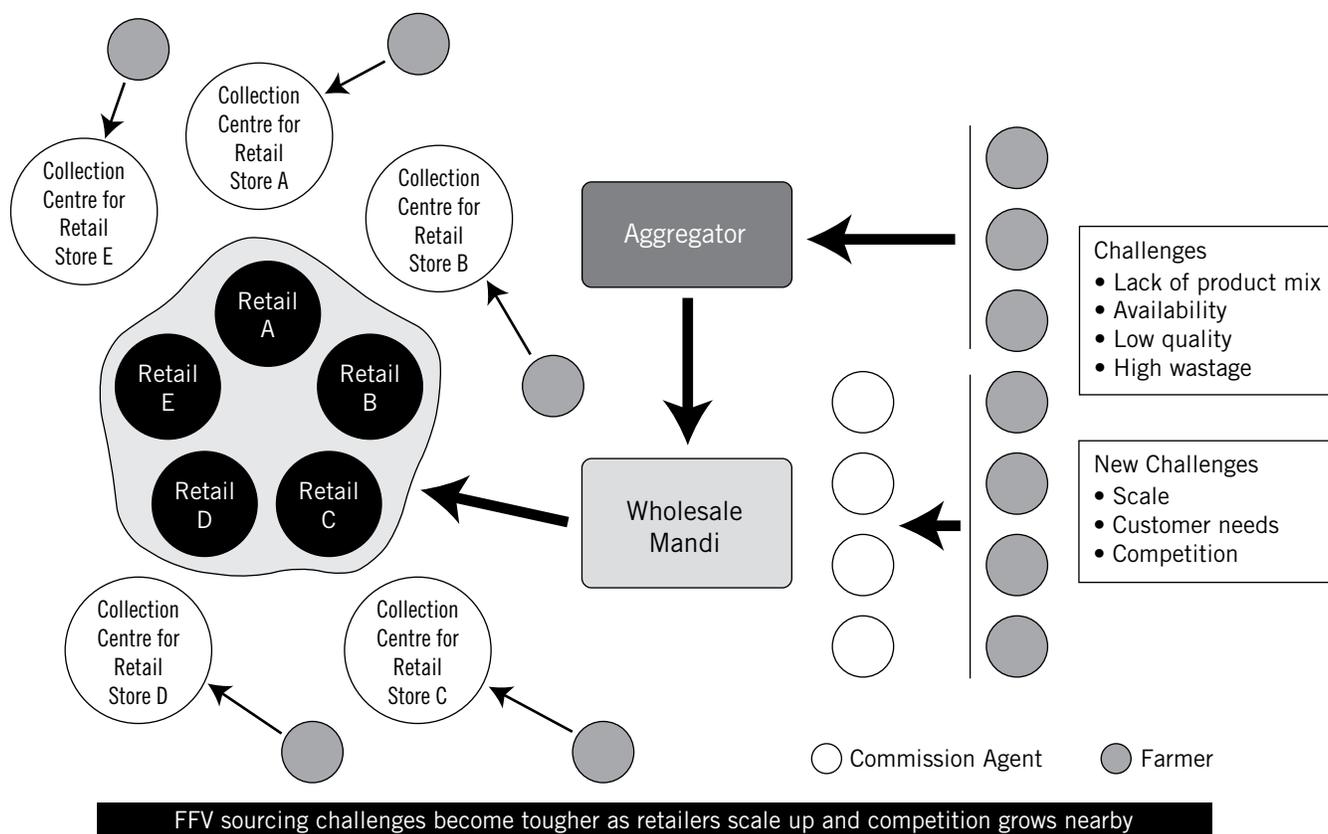


However, the “direct” model still does not provide enough incentives to the buyer to pay price premiums for quality, as there is no reliable, aggregated supplier base. In other words, the buyer has very little control over the quantity or quality of the produce received. In addition, many retailers compete with each other—their stores are near each other and utilize the same procurement models. As a result, farmers have little incentive to sell only to one retailer at all times. Farmers often side-sell to other retailers, leaving retailers reluctant to invest in farmer loyalty programs.

Given the challenges in the models described above, the GMED program pioneered two additional procurement models that have attracted considerable interest among organized wholesalers, retailers, and exporters in India:

- 1. Direct Buyer-to-Farmer Deep Procurement Model.** Under this model, actors enter into nonbinding agreements and farmers are organized to supply the needs of a buyer. Procurement is based on partnership arrangements between the two and does not generally constitute contract farming under a strict definition of the term. The continuity of and adherence to the agreement are maintained through frequent interactions, technical assistance, and extension services, leading to realization of mutual benefits. As a result, the Direct Buyer-to-Farmer model is designed to provide maximum benefits to both sides, including technical support, better returns to the farmer, and assurance for the buyer of a reliable supply of fresh produce of specified quality.
- 2. Farmer-Intermediary Buyer Model.** Under this model, a commercial intermediary (such as a cooperative society) establishes a partnership with organized groups of farmers and acts as the link between them and buyers. The intermediary might also provide extension services and logistical support to the farmers. This model works well; retailers find it particularly attractive since most are not interested in or skilled at dealing with farmers.

Figure 2. FFV Sourcing: “Direct” Procurement Model



The primary driver of change in the relationship between supply chain actors during the GMED program was the growing realization among buyers that they depended on smallholder farmers for the bulk of their fresh produce supplies. Their only means of guaranteeing a reliable supply and remaining competitive is thus to establish ongoing, mutually beneficial partnerships with organized groups of farmers.

The models pioneered under the GMED program still had certain key constraints when applied to fresh produce supply chains. Some of the constraints included:

- a production base made up of thousands of small-scale, unorganized farmers
- small farmers’ lack of access to improved production and post-harvest technology, as well as assistance in applying that technology
- lack of effective market information systems for smallholder vegetable and fruit farmers
- inadequate monitoring and traceability of fresh produce, stemming from a lack of data collection, processing systems, and facilities
- lack of coordination and control of fresh produce field operations and supply chain logistics

All of these factors led to a lack of control over product quality and mix and continued to produce excessive wastage and value loss during the transfer of produce from farm gate to retail store. ACIDI/VOCA saw that each of these constraints could be addressed through ICT solutions, which could prioritize the lack of data collection and processing systems, as well as the lack of an effective market information system for farmers.

As a result, ACIDI/VOCA decided to develop an ICT application that would make information available to farmers and keep actors informed throughout the whole supply chain, enabling them to participate in industry growth. It would also provide necessary product traceability to all supply chain actors, improving quality control and information flows. The *freshConnect* application consequently would make pricing transparent and fair for all value chain actors.

devices (valued at \$300–\$400) that could handle more sophisticated data types and worked on multiple telecom standards (GSM, GPRS, CDMA).

Step 4. Find a Partner and Develop the Business Model

The Indian fresh fruit and vegetable market is highly volatile and heterogeneous. Developing an effective ICT application required a strong partner with technical resources, the capability to take a solution to market and generate commercial interest, and the willingness to invest adequately to sustain it.

Through a competitive bidding process (see box 3), ACDI/VOCA selected Infosys as its partner. Infosys best met the requirements, as it had the necessary capability and previous experience.

Most importantly, Infosys was interested in developing a commercially sustainable line of business based on the *freshConnect* application. As a market facilitator, ACDI/VOCA did not want to be responsible for perpetually funding and upgrading the application. Therefore, finding a partner who saw the business case for providing this type of product was an indispensable part of the selection process. The roles of ACDI/VOCA and Infosys were agreed on in a binding contract in which the deliverables and usage rights were recorded.

Box 3. Finding a Good IT Partner

ACDI/VOCA conducted a competitive bidding process to identify a partner with the following characteristics:

- strong software development experience
- ability to follow iterative field test and rollout cycles
- one-stop shop that would undertake application maintenance and offer technical support and training
- capable of making investments and commercializing the application for sustainability
- agreeable to sharing intellectual property rights, whereby the donor and partner together hold full rights to the application and the entire source code

Step 5. Develop and Field Test the Product

The GMED program and Accenture market research provided Infosys initial application requirements and information about the content and context of the application during the design and development stage. Infosys was responsible for the actual development of the product. After approximately six months, Infosys produced the basic version of *freshConnect*, which was pilot tested in 2008.

Box 4. How Does *freshConnect* Work?

freshConnect has three main modules:

- *Order Placement* lets a retailer or buyer place an order, which field agents divide among supplier farmers, and generate an order confirmation.
- *Order Fulfillment* helps field agents record the quality and quantity of produce as it is harvested, sorted, and transported.
- *Order Shipment* generates tracking numbers for produce and transport trucks, then sends this information to the buyer, farmer, and field agent.

The application monitors the prices of up to six pre-selected wholesale markets (*mandis*). It gathers and monitors market price data on fresh produce posted on government-run websites and supplies farmers with this information on a weekly basis. Based on this information, a buyer and supplier then establish minimum and maximum supply prices for a given crop or variety and document these prices in a written agreement. Quality specifications can also be specified by the buyer for every variety of product ordered. As the market price fluctuates, *freshConnect* adapts to the minimum and maximum supply prices agreed in the contract. Nevertheless, agreed prices are subject to reconsideration if the market price rises or falls outside the set limits.

Over the next three months, ACDI/VOCA worked with two organized retailers, Radhakrishna Foodland and HyperCity, to support the pilot testing of *freshConnect*, together with farmers and buyers who were already known to them through the GMED program. The participation of both groups helped ACDI/VOCA understand the level of involvement of both buyer-retailers and farmers.

During the pilot, ACDI/VOCA collected feedback weekly and assigned priority levels to the issues reported. Any software bugs were fixed immediately during the pilot in order to provide an immediate solution and gather additional feedback. All high-priority issues were addressed through changes to the *freshConnect* application. For example, the pilot revealed a bottleneck on data transfer, which was addressed.

The pilot also identified suggestions and preferences on the user end of the product. For example, farmers could access *freshConnect* from the field agents' handheld devices, but feedback indicated that the farmers much preferred to access the system on their own cell phones or other mobile devices. ACDI/VOCA and Infosys accordingly suggested and introduced relevant changes to *freshConnect* before the application was ready for commercial rollout.

Step 6. Implementation

After adjusting *freshConnect* based on the recommendations gathered during the pilot phase, ACDI/VOCA and Infosys moved the application into the commercial phase. Radhakrishna Foodland and HyperCity, two large food retailers with existing relationships with ACDI/VOCA, had expressed interest in deploying *freshConnect* in their organizations.

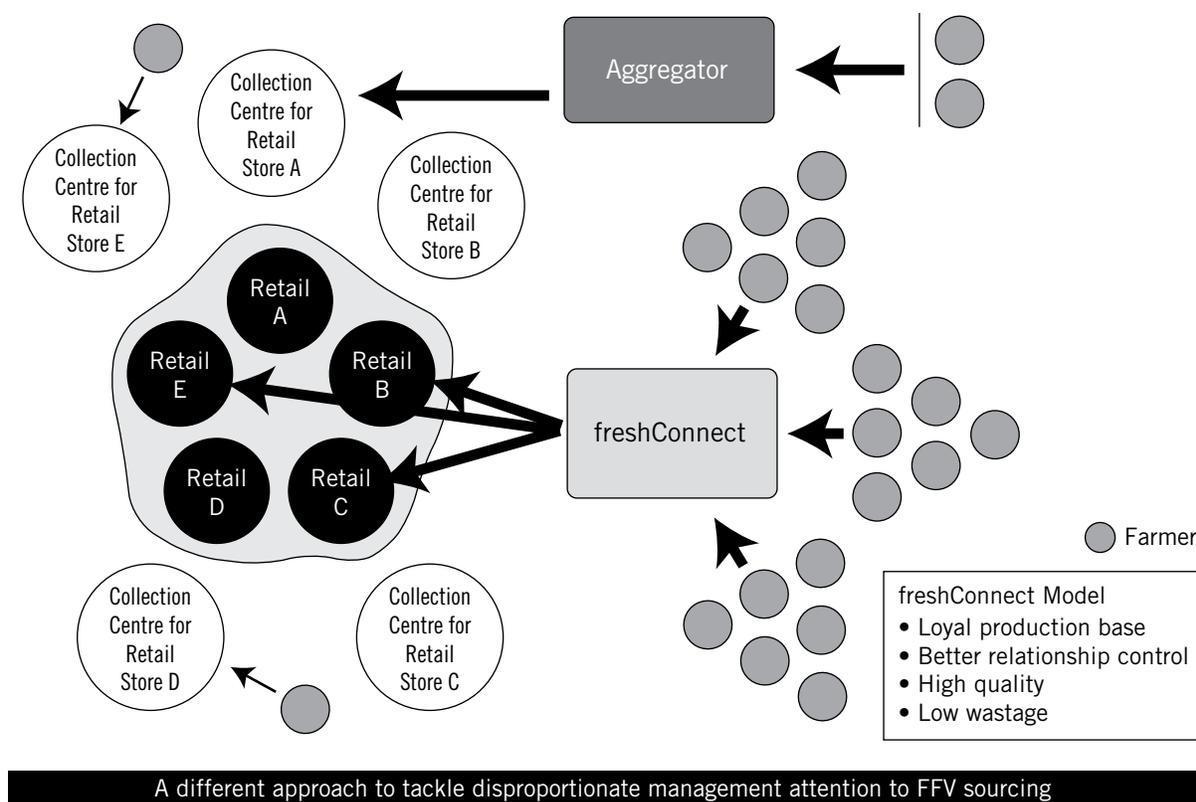
ACDI/VOCA facilitated two sets of contracts at the beginning of the implementation phase. The first was between each retailer and a cooperative that acted as an intermediary between the buyer and the farmers. This contract specified produce quality, quantity, variety, price ranges, and established a supplier credit mechanism. The second contract was between Infosys and the retailers, which laid out the cost of using *freshConnect*: a one-time setup cost and a transaction cost based on the volume of produce supplied. The cooperative selected 250 farmers to supply produce for Foodland and 65 farmers to supply HyperCity.

With the introduction of *freshConnect* to the supply chain, buyers and suppliers were able to exchange real-time, bidirectional information about the type, quantity, and quality of produce in supply and demand. This information paved the way to a new procurement model that overcame many of the challenges of the existing models described earlier.

For retailers, market information on prices, quantity, and quality demands, as well as delivery and pick-up dates, are all readily supported by the application. For smallholders, the availability of necessary technical information and up-to-date notification of current and future market demands were key benefits of *freshConnect*. The application allows market information to flow from the top to the bottom of the value chain with a minimum of filtering or manipulation by middle players. This flow has proved immensely beneficial to farmers because it allows them to plan their cropping calendars ahead of time with clear directions from buyers. Most importantly, it provides them with advanced commitments for purchase from relevant buyers. The more that producers and buyers used the system, the more they became familiarized and dependent on each other, which helped create transparency and trust.

To date, approximately 500 farmers are able to source produce to HyperCity and Foodland. Plans for expansion include implementation plans with leading fresh produce retailers in India, such as Adani AgriFresh and Bharti Field Fresh. The results of *freshConnect* are encouraging: after using the application, farm-to-market losses have declined by 10 percent at Hypercity and 15 percent at Foodland. Farmer groups in the Nandani Cooperative using the IGP applications are earning an additional 15–20 percent under the direct procurement model with Hypercity and Foodland.

Figure 3. FFV Sourcing: “freshConnect” Model



Lessons Learned

IGP India experienced both successes and challenges in developing *freshConnect* in partnership with Infosys. This section describes some of its key lessons and recommendations for other organizations considering ICT solutions to address similar gaps in a value chain.

1. Understand what ICT applications can and cannot “fix” in a value chain.

ICT applications can be one, but not the *only*, solution for fixing all challenges in the management of a given value chain. In this case, even though *freshConnect* helped farmers access the high-level buyers HyperCity and Foodland, it did not lead to a perfectly smooth functioning of the value chain. Foodland owned refrigerated trucks and was able to pick up produce directly from farmers. HyperCity, on the other hand, expected the farmers or the cooperative to deliver produce to their stores. The latter buyer was willing to pay the cost of transportation, but not to assume the liability for doing so. This situation left farmers feeling more vulnerable, since they had to assume the risk that their produce would be rejected at the store (for example, for inferior quality).

2. ICT solutions are effective at facilitating information flows within a value chain.

Lack of transparency—on pricing and desired specifications of a given good—is a major barrier to the efficient functioning of many value chains. ACDI/VOCA’s experience with *freshConnect* shows how an ICT application can gather, record, and make data available to value chain actors, facilitating greater transparency in the setting of prices. With a transparent pricing model, prices are set and updated according to actual market conditions and meet both buyer and producer expectations.

3. Need for Capacity Building

Value chains rely on relationships to function. The introduction of an ICT solution changes the way that buyers and sellers interact and how trust relationships are formed. For instance, channeling appropriate technical information to the farmers was a principal challenge of the project. Retailers were hesitant to support the application because providing farmers relevant information required additional investments. (The agricultural capacity of the farmers had to be developed to support daily delivery of information on weather, soil, type of seed to be used, and input supply options.) Without this type of support, it is extremely difficult for farmers to increase and improve their production; its absence presents a major impediment to relationship building within the value chain. Thus, making information available and accessible through an ICT solution is not sufficient to integrate a supply chain.

4. Be aware of the human aspect of ICT solutions

There are many human aspects to a chain that need to be addressed if a technology solution is going to be successful. Program field staff may, for example, need to educate producers about the role of an ICT solution and help encourage needed behavioral changes. If a system is to truly create vertical integration in a value chain, all players need to understand what is expected of them and how the ICT application will change the situation. Field staff who interact with producers on a regular basis can play an important role in promoting the use of the application and answering user questions. (Actors at the upper end of the value chain, such as retailers, procurement agents, and brokers, are generally more aware of ICT and therefore may have an easier time adopting an application and changing their behavior accordingly).

5. Design ICT solutions that benefit all levels of a value chain.

ICT solutions that disproportionately benefit only one level of a value chain may not be taken up by other levels. Similarly, ICT solutions that work against market factors are unlikely to succeed. It is therefore important to design ICT solutions that support, rather than work against, market-driven factors, as well as create benefits for both buyers and sellers.

For example, farmers obviously benefited from *freshConnect* by being able to sell produce to large buyers at an improved price. The retailers benefited by better managing their stock and maintaining inventory control, thereby reducing waste and spoilage. The *freshConnect* application also gave buyers verifiable traceability throughout the supply chain and allowed them to place bulk orders several months in advance. As a result, both farmers and retailers have strong profit incentives to continue using the application.

6. Choose strong local development partners for long-term sustainability.

Most value chain interventions have a limited duration and an exit strategy. Because of the need to support and upgrade applications, ICT interventions are particularly reliant on sustainable partnerships with private sector actors. ACDI/VOCA, for example, offered direct technical assistance to fruit and vegetable farmers during the GMED project, but realized that this role was not sustainable for an ICT solution—that *freshConnect* needed a viable and sustainable long-term provider.

Agencies should look for partners that have good business value, demonstrate innovation, and have experience developing new business models. Specifically, ACDI/VOCA and Infosys decided to partner with IFFCO, the biggest fertilizer distributor in India, and its subsidiary, Kissan Sanchar Limited (IKSL), to shepherd the *freshConnect* application into the future. IKSL provides a voice message platform for disseminating technical information to farmers and as such provided incredible potential for *freshConnect* an opportunity for leveraging, as well as replicability and sustainability. Its profitable business model is not based on recovering revenue from smallholder farmers; rather, it is built on targeting the 50 million-strong member base of IFFCO. IKSL was thus a natural choice to build on the existing *freshConnect* ICT solution and take it forward—as *freshConnect* managed logistics of the supply chain, IKSL assumed responsibility for delivering necessary technical information to suppliers to meet needs of the chain.

6. Address intellectual property rights relating to newly developed software.³

ICT interventions often involve developing new software, the intellectual property (IP) rights of which can be very valuable. When developing an ICT solution, it is therefore important to define and establish IP rights on the basis of the relationship formed among the actors in a given value chain. Most value chain development interventions involve entities registered in different countries, making the issue even more complicated. Development organizations must therefore understand the specific laws and regulations regarding intellectual property in software in the country where the application is developed and implemented.

Fully donor-funded projects are relatively straightforward; all IP rights for the software usually belong to the donor or the implementing agency. In cases where the project is only partially funded by donors, the donor and/or implementer and the software developer or vendor would share equal IP rights.

IP rights can be highly complex, particularly if a program is designed so that the vendor can continue to upgrade the software after the donor program ends. Vendors may have already developed software on which they can build for a value chain application. Or a donor may wish to grant a license for use of the intellectual property, but only for a certain period of time or only for certain regions.

To help address issues relating to IP rights, ACDI/VOCA recommends:

- evaluating the record of potential IT vendors on copyright protection and patents
- including intellectual property violation clauses in contracts with vendors and specifying the consequences of violation
- signing contracts in the country where the donor is registered to allow for greater leverage
- performing a periodic IP audit and examining new work that could be copyrighted
- discussing and deciding on courses of action if unauthorized use is detected

Most importantly, given the intense requirements relating to IP rights, it is critical that development agencies work with stable companies that are able to form strong business and technical relationships and that engage in transparent communication.

Conclusion

IGP India's experience with *freshConnect* highlights the potential benefits that ICT applications can bring to both producers and suppliers by improving information flows and communication throughout a value chain. However, the experience of ACDI/VOCA also highlights the challenges of implementing such applications. Successful implementation of an ICT intervention requires the right partners, relationship trust building, and ensuring that the ICT solutions create benefits for both buyers and sellers. While ICT can be a powerful tool to improve communication and competitiveness throughout a value chain, an ICT intervention may not be the right solution for every project or every value chain.

Box 5. The Impact of Shifting Market Conditions

Market dynamics can negatively influence the adoption of an ICT solution and lead to the abandonment of new procurement models.

In early 2009, the financial condition of the organized retail market worsened in India, forcing several big retailers to close stores or reduce their expansion.

Unfortunately, this meant there were not enough direct buyers among organized retailers to buy a substantial quantity of what farmers were producing. The growth rate in the organized retail sector dipped and consumer confidence diminished, leading retailers to offer competitive lower prices. Consequently, IT budgets were recalled or cancelled, leading to diminished demand for an ICT solution, such as *freshConnect*, in the organized retail market.

3. Intellectual Property is defined as the legal rights that result from intellectual activity undertaken by an individual or a group.

